

What is claimed is:

1. Wear resistant member, comprising:

a silicon nitride sintered body;

wherein the silicon nitride sintered body contains from

5 75 to 97% by mass of silicon nitride, from 0.2 to 5% by mass of particles of titanium nitride of which long axis is  $1\mu\text{m}$  or less and from 2 to 20% by mass of a grain boundary phase substantially containing Si-R-Al-O-N compound (here, R expresses one of rare earth elements).

10 2. The wear resistant member as set forth in claim 1: wherein the particles of titanium nitride each are singly particle dispersed in the silicon nitride sintered body.

15 3. The wear resistant member as set forth in claim 1: wherein the titanium nitride is not dissolved in the silicon nitride and the grain boundary phase as a solid solution.

20 4. The wear resistant member as set forth in claim 1: wherein the particles of titanium nitride each are particle dispersed in the grain boundary phase.

5. The wear resistant member as set forth in claim 1: wherein the particles of titanium nitride contain 80% by volume or more of particles of which aspect ratio is in the range of from 1.0 to 1.2.

25 6. The wear resistant member as set forth in claim 1: wherein the particles of titanium nitride each are  $0.2\mu\text{m}$  or less in difference of long and short axes.

7. The wear resistant member as set forth in claim 1:

wherein the particles of titanium nitride each have a roundish shape.

8. The wear resistant member as set forth in claim 1:  
wherein the silicon nitride sintered body is 0.5% or  
5 less in porosity and  $2\mu\text{m}$  or less in maximum pore diameter.

9. The wear resistant member as set forth in claim 1:  
wherein the silicon nitride sintered body is 1000MPa or  
more in three point flexural strength and  $6.5\text{MPa}\cdot\text{m}^{1/2}$  or more  
in fracture toughness.

10. The wear resistant member as set forth in claim 1:  
wherein, by the use of a thrust bearing testing machine,  
under the conditions of opponent material of SUJ2 steel ball  
provided by JIS G4805, load of 39.2MPa, and a number of  
rotation of 1200rpm, when rolling fatigue life is measured  
15 until a surface of the wear resistant member is peeled off,  
the wear resistant member has the rolling fatigue life of  $1\times 10^8$   
times or more by a number of repetition.

11. The wear resistant member as set forth in claim 1:  
wherein the wear resistant member comprises ball member.

20 12. The wear resistant member as set forth in claim  
11:  
wherein the ball member is 200MPa or more in crushing  
strength and  $6.5\text{MPa}\cdot\text{m}^{1/2}$  or more in fracture toughness.

25 13. The wear resistant member as set forth in claim  
11:  
wherein, by the use of a thrust bearing testing machine,  
under the conditions of opponent material of SUJ2 steel plane  
table provided by JIS G4805, a maximum contact stress of

5.9GPa a ball, and a number of rotation of 1200rpm, when rolling fatigue life is measured until a surface of the ball member is peeled off, the ball member has the rolling fatigue life of 400 hr or more.

5           14. The wear resistant member as set forth in claim 1:  
            wherein the grain boundary phase contains from 0.5 to 10% by mass of a rare earth element in terms of oxide, from 0.1 to 5% by mass of aluminum oxide and 5% by mass or less of aluminum nitride.

10           15. The wear resistant member as set forth in claim 1:  
            wherein the silicon nitride sintered body contains at least one of element selected from magnesium, zirconium, hafnium and tungsten in the range of from 0.1 to 5 % by mass in terms of oxide.

15           16. The wear resistant member as set forth in claim 1:  
            wherein the wear resistant member is rolling bearing member.

20           17. A method of manufacturing wear resistant member comprising silicon nitride sintered body, comprising the steps of:

            adding, to silicon nitride powder that contains oxygen by 1.7% by mass or less and  $\alpha$ -silicon nitride by 90% by mass or more and of which average particle diameter is  $1.0\mu\text{m}$  or less, from 0.5 to 10% by mass of a rare earth compound in  
25           terms of oxide, from 0.1 to 5% by mass of titanium nitride of which average particle diameter is  $0.7\mu\text{m}$  or less or a titanium compound that converts into titanium nitride due to the sintering in terms of titanium nitride, from 0.1 to 5% by

mass of aluminum oxide and 5% by mass or less of aluminum nitride are added to prepare a mixture of raw materials;

molding the mixture of raw materials into a desired shape;

5 heat treating, after degreasing the molded body obtained in the step of molding, at a temperature in the range of from 1300 to 1450°C; and

sintering the molded body undergone the heat treatment at a temperature in the range of from 1600 to 1900°C to  
10 prepare the silicon nitride sintered body.

18. The method of manufacturing wear resistant member as set forth in claim 17:

wherein, to the silicon nitride powder, the titanium nitride or the titanium compound that converts into titanium  
15 nitride due to the sintering is added divided into a plurality of portions to mix.

19. The method of manufacturing wear resistant member as set forth in claim 17:

wherein the mixture of raw materials contains titanium  
20 oxide powder of an average particle diameter of 0.5 $\mu$ m or less in the range of from 0.1 to 5% by mass in terms of titanium nitride.

20. The method of manufacturing wear resistant member as set forth in claim 17, further comprising a step of:

25 implementing HIP treatment under a pressure of 300atm or more in a non-oxidizing atmosphere at a temperature in the range of from 1600 to 1850°C.